

Conferences and Reviews

Role of Clinicians in Cigarette Smoking Prevention

ELISEO J. PÉREZ-STABLE, MD, and ELENA FUENTES-AFFLICK, MD, MPH, San Francisco, California

This review is based on a talk presented at the annual meeting of the Western Association of Physicians in Carmel, California, on February 5, 1997.

Despite a gradual decrease in smoking rates among adults, the proportion of youth who smoke regularly has remained stable. Among high school students in 1997, 19.9% of white, 7.2% of African American, and 10.9% of Latino youth reported smoking during at least 20 of the previous 30 days. Ethnic differences in beliefs, attitudes, and behavior about smoking have not been systematically considered in developing prevention interventions for adolescents. Effective school-based smoking-prevention interventions have been developed, but these are usually not appropriately implemented. Policy proposals and current laws that affect the marketing of tobacco to youth need to be emphasized as evidence increases that marketing by the tobacco industry targets youth and leads to more smoking. Smoking-prevention programs have been designed to involve physicians and other health care professionals in the clinical setting, but limited data exist on their efficacy. We review the guidelines for involving the clinicians who provide care to children in preventing the onset of tobacco use, counseling parents of children who smoke, and counseling adolescents who have started smoking. Finally, we summarize the future directions of smoking-prevention research and programs.

(Pérez-Stable EJ, Fuentes-Afflick E. Role of clinicians in cigarette smoking prevention. *West J Med* 1998; 169:23–29)

Approximately 3,000 children in the United States begin to smoke cigarettes every day, and, on average, 4.5% of adolescents take up smoking each year.^{1,2} Although smoking rates for adults have declined during the past 20 years, the rates of adolescent experimentation with and becoming regular users of tobacco have not decreased.^{2–4} Nearly all initiation of tobacco use occurs before 18 years of age, and by age 13 years, about 25% of children have experimented with cigarettes.⁵ Thus, developing innovative and effective approaches to prevent tobacco exposure among children is a public health priority.^{6–8}

In this article, we review the current epidemiology of tobacco use by youth and examine its relationship to tobacco use among adult patterns by sex and ethnicity. Interventions to prevent tobacco use among youth have largely been focused on school-based interventions. Recently, legislated policy changes limiting access to tobacco and enforcing penalties for the sale of tobacco to minors are increasing at state and community levels. We review the role of clinicians who provide care to children in preventing the onset of tobacco use, counseling parents of children who smoke, and counseling adolescents who

have started smoking. Finally, we describe future directions for programs and research in smoking prevention.

Epidemiology of Tobacco Use Among Youth

Despite a gradual decrease in cigarette smoking rates among adults during the past 30 years, little progress has been made since 1980 in reducing adolescent smoking. Among adults, smoking rates have fallen for men and women and among non-Latino whites (henceforth whites), African Americans, and Latinos.³ Although the onset of tobacco use among young adults (aged 18–24 years) is now less frequent, most smoking initiation now takes place during adolescence. There has been a shift in the age of onset and not a decrease in smoking prevalence among youth. For example, the 1997 Youth Risk Behavior Survey showed overall smoking rates for females and males, respectively, of 69.3% and 70.9% for lifetime cigarette use, 34.7% and 37.7% for current cigarette use (defined as ≥ 1 days in the previous month), and 15.7% and 17.6% for frequent use (defined as ≥ 20 days in the previous month).⁹ Table 1 shows the rates for lifetime, current, and frequent

From the Division of General Internal Medicine, Department of Medicine (Dr Pérez-Stable), the Departments of Pediatrics and of Epidemiology and Biostatistics (Dr Fuentes-Afflick), and the Medical Effectiveness Research Center for Diverse Populations, University of California San Francisco School of Medicine. This work was supported in part by grant HS077373 from the Agency for Health Care Policy and Research, Washington, D.C..

Reprint requests to Eliseo J. Pérez-Stable, MD, Medical Effectiveness Research Center for Diverse Populations, University of California San Francisco School of Medicine, 400 Parnassus Ave, Rm A-405, Box 0320, San Francisco, CA 94143-0320 (e-mail: eliseo_perez-stable@ucsfidgim.ucsf.edu).

ABBREVIATIONS USED IN TEXT

ETS = environmental tobacco smoke

NCI = National Cancer Institute

use of cigarettes by sex and ethnicity from the Youth Risk Behavior Survey in 1995 and 1997.^{4,9} The failure to decrease experimentation with and regular use of tobacco among youth mandates the development of effective interventions to prevent the initiation of tobacco use.

An evaluation of adolescent smoking behavior by race and ethnicity is important for anticipating adult smoking behavior in the future. The observed smoking behavior differences among adults by ethnicity indicates that this will be a fruitful focus of research. Latina and Asian adult women have substantially lower smoking rates on average than white and African American women, although there are fewer ethnic differences among men.¹⁰ The process of acculturation or integration into mainstream US culture appears to be associated with higher smoking rates among Latina and Asian women, and over time, the female advantage in smoking rates may be reduced.^{11,12}

Although an unexplained decrease in smoking occurred among African American youth from 15.7% in 1980 to 4.4% in 1993, the 1997 Youth Risk Behavior Survey reported a recent increase to 7.2%.^{3,9} Virtually no change has occurred among white youth in the same period (21.8% in 1980, 22.9% in 1993, and 19.9% in 1997).^{3,9} Data from national and regional surveys indicate that the frequent use of cigarettes among Latino youth has remained about 10% for the past decade (10.9% in 1997).⁹ The stable smoking rates among Latino youth are concerning because of the expectedly adverse influence of acculturation over time. The lower smoking rates among Latinos and African American youth are supported by a validation study from New York.¹³ No national longitudinal data exist on smoking behavior among Asian and Pacific Islander adolescents.

Predictors of Cigarette Smoking

Information on those factors that predict the onset of cigarette smoking among youth are limited. As many as three

quarters of adolescents try cigarettes at least once, and about half of adolescents who try cigarettes experiment on a regular basis, defined as smoking at least once per month. Only about 20% of youth become regular daily smokers by age 18 years, however, and there are substantial ethnic differences in rates.² Epidemiologic data and social psychological models imply that smoking is not an "on-off" phenomenon among youth but that a continuum exists and that there is movement along the "trying," "experimenting," and "regular use" spectrum. Studies of adolescents in California suggest that "smoking susceptibility" is an important attitude that identifies youth at risk for becoming regular smokers in the future.¹⁴ An assessment of smoking susceptibility is based on asking a respondent how certain he or she is about smoking or not smoking in the future. Thus, in designing and implementing interventions to prevent smoking, youth who are uncertain about future tobacco use need to be targeted.¹⁴ Receptivity to tobacco advertising and the use of promotional items, however, were found to be associated with increased susceptibility to smoke and the onset of smoking experimentation in a cohort of California adolescents.¹⁵

Landrine and colleagues examined a diverse sample of ninth-grade youth in Los Angeles and San Diego, California, public school districts and found important ethnic differences in predictors of cigarette smoking.¹⁶ In this cross-sectional study of 4,375 students from four ethnic groups, the researchers used multivariate models to examine all of the psychosocial and behavioral factors that had been associated with the onset of tobacco use. Peer smoking, defined by "how many of your ten closest friends smoke" and peer pressure from modeling, was the most important predictor of smoking among white youth; a lower grade-point average was the second most important predictor. Among African Americans, on the other hand, a greater risk-taking attitude was the predominant predictor of smoking, whereas peer smoking and grade-point average were not significant.

Among the Latino youth in the study, peer smoking was the most important predictor, although it explained less of the variance than among whites, and a higher level of depressive symptoms was the second most important predictor.¹⁶ The level of acculturation also influenced predictors of smoking among Latinos, with days absent

TABLE 1.—Tobacco Use in High School Students, by Sex and Ethnicity, Youth Risk Behavior Study, 1995 and 1997, %*

Tobacco Use	White				African American				Latino			
	1995		1997		1995		1997		1995		1997	
	M	F	M	F	M	F	M	F	M	F	M	F
Lifetime use or ever tried	71	71	70	70	71	63	70	67	78	75	77	73
Current use (≥1 of 30 days)	37	40	40	40	28	12	28	17	35	33	36	32
Frequent use (≥20 of 30 days)	18	21	20	20	9	1	10	4	11	9	13	8
Smokeless use (chew of snuff, ≥1 of 30 days)	25	3	21	2	4	1	3	1	6	3	8	1

*Adapted from Centers for Disease Control and Prevention.^{4,9}

from school being significant among the less acculturated. Among the most acculturated youth, risk-taking attitude and depressive symptoms were significant predictors, and among the bicultural Latinos, risk-taking attitude and grade-point average were also significant predictors. The most significant predictors of smoking among Asians were days absent from school, peer smoking, and alcohol consumption by adult role models.¹⁶ The striking findings of this study were the absence of a significant association between parental smoking and youth smoking and the nearly universal importance of peer smoking (except among African Americans). These observations can be used to develop interventions.

There is a clear need for additional basic social and behavioral research of adolescents of all ethnic groups to further understand the factors that influence smoking experimentation, initiation, regular use of cigarettes, and frequent use leading to dependence. Nicotine dependence may develop as a result of biologic susceptibility in the appropriate social environment. Thus, multidisciplinary collaboration among scientists is needed to further identify those factors that lead youth to become addicted to nicotine.

Health Consequences of Tobacco Use in Adolescents

Active occasional smoking by adolescents leads to nicotine addiction, with subsequent increased morbidity and mortality from cancer and cardiovascular disease. Projections from the Centers for Disease Control and Prevention, based on current smoking rates among young adults, show that 885,000 persons currently 17 years of age or younger and living in seven western states will die of causes directly attributable to nicotine addiction.¹⁷

More short-term adverse health consequences of cigarette smoking are also evident among young people who smoke. Cigarette smoking among adolescents causes an increase in respiratory tract infections, including the common cold, and an overall increase in respiratory symptoms.^{2,18} Subtle but quantifiable changes in pulmonary function, exacerbation of asthma, and decreased physical fitness are also established consequences of cigarette smoking among adolescents.^{2,18} Young women who smoke while pregnant will have smaller infants, are at an increased risk of having infants with congenital malformations, and a greater likelihood of having spontaneous abortions.² Cigarette smoking also functions as a "gateway drug," leading to an increased likelihood that youth will use other substances, including alcohol and illicit drugs, with their subsequent social sequelae.²

Smoking Prevention in Schools

Many controlled trials have evaluated the efficacy of school-based interventions to prevent cigarette smoking initiation and regular use.² A meta-analysis of 90 school-based programs indicated that there is a 4.5% lower prevalence of regular cigarette use among youth in the

social influence intervention programs.¹⁹ Although the incidence and prevalence of cigarette smoking were significantly reduced in adolescents for as long as four years, follow-up to six years failed to show significant differences between control and intervention groups.^{19,20} Observed ethnic differences in smoking attitudes, beliefs, and behavior have not been systematically incorporated into a prevention intervention directed at youth of diverse backgrounds. Despite the apparent failure at sustaining decreased smoking rates in long-term follow-up, the content of effective interventions has been well defined.

The most successful school-based smoking-prevention programs emphasize the social factors that influence smoking and the short-term consequences of smoking and teach adolescents skills on how to resist social pressures or develop refusal skills that can be applied to smoking or other issues.² Furthermore, school-based smoking-prevention programs need to be incorporated into the existing curricula, involve students in the delivery, be led by specially trained teachers, and incorporate culturally appropriate content. Unfortunately, most school-based smoking-prevention curricula are not set up with these components in mind, are presented as special add-on programs in one or two classes, are taught by a teacher who has received no special training on the topic, and are frequently focused on the rational approach of providing information, which is usually ineffective.² Furthermore, to maximize the limited efficacy of the school-based programs, these need to be implemented in the sixth grade or earlier and include at least five sessions during the course of a school year. Considering that most school districts have limited programs, the implementation of adequately funded, universal school-based smoking-prevention programs starting in the sixth grade could have a favorable effect on adult smoking rates in just a few years.

Health Policy Interventions

Advocating policy changes and enforcing existing laws that prohibit the sale of tobacco products to youth are strategies to decrease access to tobacco among children that have been actively pursued by the tobacco control community in recent years. Increasing the cost of cigarettes by taxation not only helps finance tobacco education but also decreases access to tobacco by youth. The real price of a pack of cigarettes as a proportion of the real weekly income of high school seniors, however, was only 1.9% in 1989, which is only a slight increase from 1.4% in 1982.²¹ Cigarettes remained relatively inexpensive to most adolescents at average 1989 prices, although increased state taxes since that time have increased the price. Laws in most states that require vendors to document the age of buyers as 18 years of age or older are often not enforced. Data from the Youth Risk Behavior Survey in 1995 showed that about half of 12th graders who smoked at least 1 of the previous 30 days purchased cigarettes on their own, and 70% of males and 86% of females who did so were not asked for proof of age.⁴

Although the proportion of adolescents who purchased cigarettes on their own varied somewhat by age, sex, and ethnicity, overall 75% of males and 81% of females who purchased cigarettes were not asked to show proof of age when purchasing cigarettes.⁴ Enforcement of these ordinances would probably decrease easy access to tobacco and affect the number of young people becoming addicted to nicotine.

The tobacco industry increased annual expenditures from \$2.1 billion in 1980 to \$4.2 billion in 1989 (in 1993 dollars) to promote their product. Promotional expenditures account for the entire increase over this time because direct advertisement expenditures have actually decreased from \$1.3 billion to about \$1 billion.²¹ Among persons aged 12 to 17 years, 25% of nonsmokers report having received promotional items from tobacco companies, which are often obtained at sporting and cultural events.² This increased tobacco industry investment in marketing expenditures parallels increased initiation rates among adolescents during the same period, and it has been shown that adolescents smoke the most heavily advertised brands.^{21,22} The causal association of receptivity and exposure to tobacco industry promotional items and advertisements is increasing.^{15,23} The successful advertisement logos of the tobacco industry are well-recognized symbols by adults, adolescents, and children, and in fact, 6-year-old children in one study were as likely to identify the "Joe Camel" cartoon figure as they were Mickey Mouse.²⁴

The federal government is considering implementing new regulations on the tobacco industry, using the fact that nicotine is a drug and cigarettes are a drug delivery system. This has been linked to recent revelations by one cigarette manufacturer that undermine the industry's legal defense from litigation by former smokers in whom cancer and other diseases develop. One proposal suggested that the Food and Drug Administration regulate the nicotine content of cigarettes by gradually decreasing the amount per cigarette over several years.²⁵ Thus, cigarettes would lose the power of delivering an addictive substance, and the number of youth who become regular smokers would likely decrease significantly. By weaning the nicotine content of cigarettes, addicted smokers would also not suffer abstinence symptoms abruptly. Some form of increased regulation of the tobacco industry within the decade appears likely.

Clinician-Based Interventions

Physician- or nurse-mediated interventions to promote smoking cessation among adults were developed, implemented, and tested in randomized control designs with moderate effects on biochemically proven smoking cessation in diverse clinical settings, ranging from 5% to 15% abstinence at one year.²⁶⁻²⁹ This strategy led to a National Cancer Institute (NCI) program to incorporate primary health care clinicians in a public health approach to smoking cessation.²⁸ The established effectiveness of nicotine replacement therapy in conjunction

with minimal physician counseling to quit smoking has further strengthened this approach.³⁰

A similar program has been developed by the NCI to target clinicians caring for children with the use of the five As: anticipate, ask, advise, assist, and arrange.³¹ *Anticipate* refers to planning what tobacco-related risks need to be addressed during a child's development. *Ask* about experimenting with smoking starting at age 8 years, and ask parents about their smoking and other sources of environmental tobacco smoke (ETS) exposure for the child. *Advise* adolescents (and parents) to quit smoking, and *assist* with self-help literature, specific techniques, nicotine replacement therapy, or referral to groups. Finally, *arrange* for follow-up visits to reinforce quitting or to review circumstances of relapse.

Unlike with the adult literature, studies that have evaluated the effectiveness of the NCI program directed at clinicians caring for children, the usefulness of interventions focused on decreased ETS exposure, or the applicability of these methods among diverse ethnic groups are limited.³² In a survey of residents in primary care specialties, only 32% of pediatric residents reported any training in smoking cessation counseling, and most scored significantly lower than their primary care colleagues in family medicine and general internal medicine.³³ Pediatric residents who were taught smoking-cessation counseling techniques however, performed as well as those in other primary care specialties.³⁴ A feasibility study showed that pediatric residents trained to use the NCI program raised tobacco issues more often, counseled adolescents about smoking cessation more frequently, and reported the use of more effective techniques than a nonrandomized comparison group who failed to attend the teaching seminars.³⁵

Limited empiric evidence is available on the practice of pediatric clinicians regarding tobacco prevention. A survey of 100 practicing pediatricians in Maine showed that 91% advise parents who smoke to quit, spending an average of 4.9 minutes doing so, but only 43% talk to at least three quarters of parents about the effects of smoking on their children.³⁶ A similar study of 72 pediatricians in Vermont found that 29 (40%) routinely queried parents about smoking; 8 (11%) recorded the information in the medical record; and 68 (94%) advised at least some parents to quit smoking, spending an average of 4.4 minutes doing so.³⁷ Environmental tobacco smoke exposure was addressed by the Vermont pediatricians by advising parents to smoke away from children (55 physicians [77.6%]), cutting down the consumption of cigarettes (29 physicians [40%]), and setting a quit date (16 physicians [22%]).³⁷ A survey of primary care physicians from Connecticut conducted in 1992 showed that only 20% of pediatricians and 24% of family physicians always counseled 10- to 12-year-old children about smoking prevention.³⁸ Recently, a survey of California primary care physicians caring for adolescents found that pediatricians screen 11- to 14-year-old adolescents for regular smoking 61% of the time during a routine examination, only 10% of the time during an acute care visit, and 21% of the time asked about ever having tried a cigarette.³⁹

Other data collected from pediatricians and parents of their patients indicate that counseling about smoking prevention and cessation and about the harms of ETS exposure would be welcomed and considered important.^{40,41} Barriers to counseling about smoking prevention or cessation reported by pediatricians include the perception that techniques are ineffective, feeling ill-at-ease about giving this advice, lack of time, and fear that parents may think that this is intrusive.^{33,37,38} In one survey of parents, only 15% reported that their smoking was “none of the doctors’ business,” but more than half thought that talking about smoking was “part of the pediatrician’s job.”⁴¹ The amount of time available to dedicate to smoking prevention and cessation for children, adolescents, and their parents may be even more limited in managed care-dominated areas such as California. Demonstrating the efficacy of clinician-based interventions would assist in prioritizing smoking prevention in the medical groups and health plans. Nurses and other office staff can provide much of the structural and interactive content of an office-based intervention, but primary care clinicians need to be trained in the appropriate techniques.

Preventing ETS Exposure in Children

Exposure to ETS has been associated with a substantial increase in risk of the sudden infant death syndrome, acute respiratory tract infections, recurrent otitis media with chronic middle-ear effusions, exacerbation of asthma, and admission to a hospital for bronchitis and pneumonia in children younger than 5 year.^{18,42} Passive smoking was estimated to account for \$661 million in medical expenditures in 1987, and maternal smoking increases the average annual health care expenditures by \$175 per year per child aged 2 years and younger.⁴³ Some studies have found that parents’ cigarette smoking teaches the utility and acceptability of smoking to their children and is strongly associated with increased smoking by their children as adults.^{18,42} Environmental tobacco smoke exposure during childhood has been found to significantly increase the risk of lung cancer in adults who never actively smoke,^{44,45} and among adults, ETS exposure increases the risk of morbidity and mortality from heart disease.⁴⁶ A recent study of 175 healthy Puerto Rican children used urinary cotinine levels to quantify ETS exposure and showed that smoke from their mothers made the greatest contribution to ETS, households where 20 or more cigarettes per day were smoked doubled urinary cotinine excretion in children, and children aged 2 to 4 years were significantly more exposed than children aged 5 to 11 years.⁴⁷

In 1986, an estimated 53% to 76% of households in the United States contained one adult resident who smoked cigarettes, and as many as 12 million children 5 years of age and younger were exposed to ETS.⁴⁵ A recent national survey reported that 15 million children and adolescents younger than 18 years were exposed to ETS, with as many as half of smoking adults having children residing in their homes, and most of these

homes permitted smoking in some or all areas of the home.⁴⁸ In California, 7.3% ($\pm 0.8\%$) of households had a current cigarette smoker and children in the home; 72.3% of those households allowed smoking in some or all areas of the home.⁴⁸ The Third National Health and Nutrition Examination Survey (1988–1991) found that 43% of children aged 2 months to 11 years lived in a home with at least one smoker.⁴⁹ Furthermore, the geometric mean of serum cotinine levels among non-tobacco users with ETS exposure was highest among children aged 4 to 11 years.⁴⁹ The California 1993 Tobacco Survey reported that 75% to 85% of households with children or adolescents were entirely smoke free, and Asian and African American households were more likely to be smoke free than white and Latino households.¹⁴

Several studies have examined the efficacy of clinical interventions to decrease ETS exposure in children. An intensive counseling intervention directed at families of asthmatic children (aged 6–17 years) reported a significant 79% reduction in ETS exposure (validated by nicotine air monitor) at one year in the intervention group compared with 42% for a monitored group and 34% for a “usual care” group, with sustained effects at two years.^{50,51} These results with an intensive intervention in families with chronically ill children imply that behavioral change to minimize ETS exposure is feasible. A randomized trial of a home-based nurse-delivered intervention was evaluated in 933 infants, of whom 25.2% had smoking mothers.⁵² Among the 121 infants of smoking mothers who completed the study, infants in the intervention group were exposed to 5.9 fewer cigarettes per day and reported a lower prevalence of persistent respiratory symptoms despite no differences in urinary cotinine excretion.⁵² Wall and colleagues randomly assigned 49 pediatric practices to receive a 45-minute training intervention on brief counseling for new mothers on the first four well-baby visits to decrease ETS exposure compared with a hospital packet with written information received by all mothers.⁵³ Pediatricians were taught to deliver a two-minute brief intervention with an emphasis on counseling smoking mothers (42.5% of study sample) to quit. At six months’ follow-up, smoking mothers in the intervention group had higher quit rates (5.9% versus 2.7%) and lower relapse rates (45% versus 55%), providing evidence that a brief intervention can have a positive effect on maternal smoking.⁵³

Parents of young children visit a pediatrician more often than any other physician, and these visits offer a window of opportunity to effect a behavior change among these parents and promote smoking cessation.^{36,37} Pediatric clinicians may be uniquely positioned to counsel these adults to quit smoking but need to be comfortable with delivering this intervention. Because less than half of these adults are advised to quit by their own primary physicians, a reminder system for pediatricians could increase the likelihood that time is dedicated to this important issue. Studies in adult medical practices showed that placing a reminder in the patient record increased the time that physicians spent counseling smok-

ers from 1.4 to 3.6 minutes and increased the percentage of patients who had quit successfully from 1.3% to 7.0% at one year and that setting a specific date to quit smoking increased the likelihood of a quit attempt by four to seven times.⁵⁴ The efficacy of nicotine replacement therapy for about eight weeks has been demonstrated in randomized clinical trials to increase the likelihood of abstinence at six months from 9% to 22%.³⁰ Recently, similar efficacy results were shown with treatment using sustained-release bupropion hydrochloride in nondepressed smokers motivated to quit (validated abstinence of 23% versus 12% at 12 months).⁵⁵ Thus, given the evidence on the feasibility and effectiveness of training clinicians to counsel their patients to quit smoking, pediatric clinicians are uniquely positioned to counsel a smoking parent to quit smoking.

Training pediatric clinicians how to counsel parents who smoke to quit is one method to decrease ETS exposure among children 5 years of age and younger. Among most parents who are nonsmokers, a pediatric clinician can also teach parents about assessing for and preventing ETS exposure. For example, a pediatric clinician may need to assist a nonsmoking parent (more often the mother) in advising a smoking parent or relative on how to quit, for the well-being of the family. The pediatrician also needs to plan for the prevention of smoking initiation by counseling parents on talking to their children about smoking at an early age and to actively counteract tobacco industry advertisements and promotions directed at children. Clinicians can also provide leadership and support to enhance school-based programs and community-based efforts. Furthermore, asking children beginning at age 8 years about experimenting with tobacco use needs to become routine practice for pediatric clinicians.

Conclusions and Future Directions

The lack of success in controlling tobacco use among US youth stands in contrast to the reasonable success among adults. If current trends continue, adolescent smoking rates will soon equal those of adults, and thus, the prospect for further reductions in national smoking rates, tobacco-related disease rates, and economic costs is unlikely to change in the foreseeable future.

A wider implementation of effective techniques used in school-based programs to prevent tobacco use among young persons is needed. Culturally appropriate interventions to prevent tobacco use need to be developed and implemented in other than school-based settings where most efforts to prevent the onset of cigarette smoking have taken place. Community-based interventions with outreach through neighborhoods and youth-oriented media, targeting youth at an early age (such as 8 years), need to be considered as viable intervention strategies.

Policy changes to decrease access of tobacco products to children by increasing their cost and making it more difficult to purchase cigarettes should be adopted at state and federal levels. Additional regulation of tobacco industry by limiting advertisement and promotion and regulating nicotine content will require a con-

certed federal effort and popular support to implement. Physicians and other health professionals caring for children will need to become more actively involved in promoting smoking prevention.

REFERENCES

1. Fiore MC, Novotny TE, Pierce JP, Hatzianandreu EJ, Patel KM, Davis RM. Trends in cigarette smoking in the United States: the changing influence of gender and race. *JAMA* 1989; 261:49–55
2. Preventing tobacco use among young people: a report of the Surgeon General. Atlanta (Ga): US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1994
3. Giovino GA, Schooley MW, Zhu BP, et al. Surveillance for selected tobacco-use behaviors—United States, 1900–1994. *MMWR CDC Surveill Summ* 1994; 43(SS-3):1–43
4. Kann L, Warren CW, Harris WA, et al. Youth Risk Behavior Surveillance—United States, 1995. *MMWR CDC Surveill Summ* 1996; 45(SS-4):1–84
5. Giovino GA, Henningfield JE, Tomar SL, Escobedo LG, Slade J. Epidemiology of tobacco use and dependence. *Epidemiol Rev* 1995; 17:48–65
6. Kessler DA, Notanblut SL, Wilkenfeld JP, Mayl SL, Bernstein IBG, Thompson L. Nicotine addiction: a pediatric disease. *J Pediatr* 1997; 130:518–524
7. Glynn TJ, Greenwald P, Mills SM, Manley MW. Youth tobacco use in the United States—Problems, progress, goals, and potential solutions. *Prev Med* 1993; 22:568–575
8. Reid DJ, McNeill AD, Glynn TJ. Reducing the prevalence of smoking in youth in western countries: an international review. *Tobacco Control* 1995; 4:266–277
9. Office on Smoking and Health, Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (CDC). Tobacco use among high school students—United States, 1997. *MMWR Morb Mortal Wkly Rep* 1998; 47:229–233
10. CDC. Cigarette smoking among adults—United States, 1994. *MMWR Morb Mortal Wkly Rep* 1996; 45:588–590
11. Marín G, Pérez-Stable EJ, Marín BV. Cigarette smoking among San Francisco Hispanics: the role of acculturation and gender. *Am J Public Health* 1989; 79:196–199
12. Jenkins CNH, McPhee SJ, Bird JA, Ngoc-The H, Bonilla BA, Thai VK. Cancer risks and prevention behaviors among Vietnamese refugees. *West J Med* 1990; 153:34–39
13. Wills TA, Cleary SD. The validity of self-reports of smoking: analyses by race/ethnicity in a school sample of urban adolescents. *Am J Public Health* 1997; 87:56–61
14. Pierce JP, Evans N, Cavin SW, et al. Tobacco use in California: regional vs. state level changes, 1990–1993, San Francisco Region. La Jolla (Calif): University of California—San Diego; 1994
15. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC. Tobacco industry promotion of cigarettes and adolescent smoking. *JAMA* 1998; 279:511–515
16. Landrine H, Richardson JL, Klonoff EA, Flay B. Cultural diversity in the predictors of adolescent cigarette smoking: the relative influence of peers. *J Behav Med* 1994; 17:313–346
17. CDC, BRFSS Coordinators. Projected smoking-related deaths among youth—United States. *MMWR Morb Mortal Wkly Rep* 1996; 45:971–974
18. Gidding SJ, Morgan W, Perry C, Isabel-Jones J, Bricker JT, for Committee on Atherosclerosis and Hypertension in Children. Active and passive tobacco exposure: a serious pediatric health problem. *Circulation* 1994; 90:2581–2590
19. Bruvold WH. A meta-analysis of adolescent smoking prevention programs. *Am J Public Health* 1993; 83:872–880
20. Flay BR, Koepke D, Thompson SJ, Santi S, Best JA, Brown KS. Six-year follow-up of the first Waterloo school smoking prevention trial. *Am J Public Health* 1989; 79:1371–1376
21. Cummings KM, CDC. Trends in smoking initiation among adolescents and young adults—United States, 1980–1989. *MMWR Morb Mortal Wkly Rep* 1995; 44:521–525
22. CDC. Changes in the cigarette brand preferences of the adolescent smokers—United States, 1989–1993. *MMWR Morb Mortal Wkly Rep* 1994; 43:577–581
23. King C, Siegel M, Celebucki C, Connolly GN. Adolescent exposure to cigarette advertising in magazines. *JAMA* 1998; 279:516–520
24. DiFranza JR. Who profits from tobacco sales to children? *JAMA* 1990; 263:2784–2787
25. Benowitz NL, Henningfield JE. Establishing a nicotine threshold for addiction: the implications of tobacco regulation. *N Engl J Med* 1994; 331:123–125
26. Cummings SR, Coates TJ, Richard RJ, et al. Training physicians in counseling about smoking cessation: a randomized trial of the 'Quit for Life' Program. *Ann Intern Med* 1989; 110:640–647
27. Cohen SJ, Stookey GK, Katz BP, Drook CA, Smith DM. Encouraging primary care physicians to help smokers quit: a randomized controlled trial. *Ann Intern Med* 1989; 110:648–652

28. Glynn TJ, Manley MW. How to help your patients stop smoking: a National Cancer Institute manual for physicians. Bethesda (Md): US Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute; 1989
29. Tobacco and the clinician: interventions for medical and dental practice. Washington (DC): US Department of Health and Human Services, Public Health Service, National Institutes of Health, NIH publication No. 94-3693, 1994
30. Fiore MC, Smith SS, Jorenby DB, Baker TB. The effectiveness of the nicotine patch for smoking cessation: a meta-analysis. *JAMA* 1994; 271:1940-1947
31. Epps RP, Manley MW. A physician's guide to preventing tobacco use during childhood and adolescence. Rockville (Md): National Cancer Institute; 1990
32. Epps RP, Manley MW, Glynn TJ. Tobacco use among adolescents: strategies for prevention. *Pediatr Clin North Am* 1995; 42:389-402
33. Kenney RD, Lyles MF, Turner RC, et al. Smoking cessation counseling by resident physicians in internal medicine, family practice, and pediatrics. *Arch Intern Med* 1988; 148:2469-2473
34. Strecher VJ, O'Malley MS, Villagra VG, et al. Can residents be trained to counsel patients about quitting smoking? Results from a randomized trial. *J Gen Intern Med* 1991; 6:9-17
35. Klein JD, Portilla M, Goldstein A, Leininger L. Training pediatric residents to prevent tobacco use. *Pediatrics* 1995; 96:326-330
36. Frankowski BL, Secker-Walker RH. Advising parents to stop smoking: opportunities and barriers in pediatric practice. *AJDC* 1989; 143:1091-1094
37. Frankowski BL, Weaver SO, Secker-Walker RH. Advising parents to stop smoking: pediatricians and parents attitudes. *Pediatrics* 1993; 91:296-300
38. Gregorio DI. Counseling adolescents for smoking prevention: a survey of primary care physicians and dentists. *Am J Public Health* 1994; 84:1151-1153
39. Franzgrote M, Ellen JM, Millstein SG, Irwin CE. Screening for adolescent smoking: results of a survey of primary care physicians in California. *Am J Public Health* 1997 Aug;87(8):1341-1345
40. Cheng TL, Savageau JA, Bigelow C, Charney E, Kumar S, DeWitt TG. Assessing mothers' attitudes about physician's role in child health promotion. *Am J Public Health* 1996; 86:1809-1812
41. Frankowski BL, Secker-Walker RH. Pediatricians' role in smoking prevention and cessation. In: Institute NC, editor. Tobacco and the clinician: interventions for medical and dental practice. Washington (DC): US Department of Health and Human Services, Public Health Service, National Institutes of Health; 1994, pp 232-245. NIH publication No. 94-3693
42. The health consequences of involuntary smoking: a report of the Surgeon General. Washington (DC): US Department of Health and Human Services, Public Health Service, Office of the Assistant Secretary for Health, Office on Smoking and Health; 1986. DHHS publication No. (CDC) 87-8398
43. Stoddard JJ, Gray B. Maternal smoking and medical expenditures for childhood respiratory illness. *Am J Public Health* 1997; 87:205-209
44. Janerich JT, Thompson WD, Varela LR, et al. Lung cancer and exposure to tobacco smoke in the household. *N Engl J Med* 1990; 323:632-636
45. US Environmental Protection Agency, Office of Research and Development, Office of Air and Radiation. Respiratory health effects of passive smoking: lung cancer and other disorders. Washington (DC): US Department of Health and Human Services, Public Health Service, National Institutes of Health; 1993
46. Glantz SA, Parmley WW. Passive smoking and heart disease. *Circulation* 1991; 83:1-12
47. Preston AM, Ramos LJ, Calderon C, Sahai H. Exposure of Puerto Rican children to environmental tobacco smoke. *Prev Med* 1997; 26:1-7
48. CDC. State-specific prevalence of cigarette smoking among adults, and children's and adolescents' exposure to environmental tobacco smoke—United States, 1996. *MMWR Morb Mortal Wkly Rep* 1997; 46:1038-1043
49. Pirkle JL, Flegal KM, Bernert JT, Brody DJ, Etzel RA, Maurer KR. Exposure to the U.S. population to environmental tobacco smoke: the third National Health and Nutrition Examination Survey, 1988 to 1991. *JAMA* 1996; 275:1233-1240
50. Wahlgren DR, Hovell MF, Meltzer SB, Hofstetter CR, Zakarian JM. Reduction of environmental tobacco smoke exposure in asthmatic children: a 2-year follow-up. *Chest* 1997; 111:81-88
51. Hovell MF, Meltzer SB, Zakarian JM, et al. Reduction of environmental tobacco smoke exposure among asthmatic children: a controlled trial. *Chest* 1994; 106:440-446
52. Greenberg RA, Stretcher VJ, Bauman KE, et al. Evaluation of a home-based intervention program to reduce infant passive smoking and lower respiratory illness. *J Behav Med* 1994; 17:273-290
53. Wall MA, Severson HH, Andrews JA, Lichtenstein E, Zoref L. Pediatric office based smoking intervention: impact on maternal smoking and relapse. *Pediatrics* 1995; 96:622-628
54. Kottke TE, Battista RN, DeFries GH, Brekke ML. Attributes of successful smoking cessation interventions in medical practice. *JAMA* 1988; 259:2883-2889
55. Hurt RD, Sachs DPL, Glover ED, et al. A comparison of sustained-release bupropion and placebo for smoking cessation. *N Engl J Med* 1997; 337:1195-1202